

4. SUMMARY OF SOUTH PACIFIC AND SOUTH INDIAN OCEAN TROPICAL CYCLONES

4.1 GENERAL

On 1 October 1980, JTWC's area of responsibility (AOR) was expanded to include the Southern Hemisphere from 180° longitude westward to the coast of Africa. Details on Southern Hemisphere tropical cyclones and JTWC warnings from July 1980 through June 1982 are contained in Diercks et al. (1982) and from July 1982 through June 1984, in Wirfel and Sandgate (1986). Information on Southern Hemisphere tropical cyclones after June 1984 can be found in the applicable Annual Tropical Cyclone Report.

The Naval Western Oceanography Center (NWOC) Pearl Harbor, HI issues warnings on tropical cyclones in the South Pacific east of 180° longitude. Tropical cyclones in NWOC's AOR are included in this and previous Annual Tropical Cyclone Reports.

In accordance with USCINCPACINST 3140.1 (series), Southern Hemisphere tropical cyclones are numbered sequentially from 1 July through 30 June. This convention is established to encompass the Southern Hemisphere tropical cyclone season, which primarily occurs from January through April. There are two ocean basins for warning purposes - the South Indian (west of 135° east longitude) and the South Pacific (east of 135° east longitude) - which are identified by appending the suffixes "S" and "P" respectively to the tropical cyclone number.

Intensity estimates for Southern Hemisphere tropical cyclones are derived from the interpretation of satellite imagery using the Dvorak technique (Dvorak, 1984) and in rare instances from surface observations. The Dvorak technique relates specific cloud signatures to maximum sustained one-minute average wind speeds. The conversion from maximum sustained winds to minimum sea-level pressure is obtained from the Atkinson and Holliday (1977) relationship (Table 4-1).

4.2. SOUTH PACIFIC AND SOUTH INDIAN OCEAN TROPICAL CYCLONES

As in 1989, tropical cyclone activity in 1990 (Table 4-2) approached the climatological mean of 28 storms (Table 4-3). An unusually large number of tropical cyclones occurred in the South Indian Ocean (Table 4-4). The number of storms near Australia was slightly below average, and there were only half the normal number east of 165° E. The activity began early, with two tropical cyclones in July, a month which rarely sees any. By November, six tropical cyclones had developed, three reaching

**TABLE 4-1 MAXIMUM SUSTAINED SURFACE
WINDS AND EQUIVALENT MINIMUM SEA-LEVEL
PRESSURE (ATKINSON AND HOLLIDAY, 1977)**

<u>MAXIMUM SUSTAINED SURFACE WIND (KT)</u>	<u>MINIMUM SEA-LEVEL PRESSURE (MB)</u>
30	1000
35	997
40	994
45	991
50	987
55	984
60	980
65	976
70	972
75	967
80	963
85	958
90	954
95	948
100	943
105	938
110	933
115	927
120	922
125	916
130	910
135	906
140	898
145	892
150	885
155	879
160	872
165	865
170	858
175	851
180	844

tropical storm intensity and one typhoon intensity. Tropical cyclone activity was almost continuous from December through March (Figure 4-1), with several instances of multiple outbreaks. For two days in March, five tropical cyclones were active simultaneously. Two systems in 1990 reached super typhoon intensity - Alibera (08S) and Alex (24S).

Alibera (08S) was not only the most intense system, it also lasted the longest, being in warning status for two weeks. Plots of the tropical cyclone best tracks appear in Figures 4-2 and 4-3.

TABLE 4-2

**SOUTH PACIFIC AND SOUTH INDIAN OCEAN
1990 SIGNIFICANT TROPICAL CYCLONES
(1 July 1989 - 30 June 1990)**

TROPICAL CYCLONE	NUMBER	MAXIMUM PERIOD OF WARNING	WARNINGS	SURFACE	ESTIMATED MSLP (MB)
			ISSUED	WINDS-KT (M/SEC)	
01S ----	10	Jul - 11 Jul	4	25 (13)	1002
02S ----	14	Jul - 16 Jul	6	35 (18)	997
03S ----	25	Sep - 27 Sep	5	30 (15)	1000
04S ----	13	Oct - 14 Oct	4	30 (15)	1000
05S ----	31	Oct - 02 Nov	8	35 (18)	997
06S Pedro	08	Nov - 12 Nov	9	65 (33)	976
07P Felicity	15	Dec - 16 Dec	3	60 (31)	980
07P Felicity*	17	Dec - 18 Dec	3	55 (28)	984
08S Alibera	19	Dec - 02 Jan	31	135 (69)	904
09S Bavomavo	02	Jan - 07 Jan	13	85 (44)	958
10S Sam	13	Jan - 18 Jan	11	50 (26)	987
11S Tina	25	Jan - 28 Jan	6	45 (23)	991
12P Nancy	29	Jan - 02 Feb	8	65 (33)	976
13P Ofa**	31	Jan - 08 Feb	17	115 (59)	927
14S Cezera	01	Feb - 09 Feb	16	80 (41)	963
15S Dety	02	Feb - 08 Feb	12	95 (49)	949
16P Peni**	13	Feb - 17 Feb	9	60 (31)	980
17S Vincent	01	Mar - 06 Mar	11	70 (36)	972
18S Edisaona	01	Mar - 07 Mar	14	100 (51)	944
19P Greg	03	Mar - 05 Mar	5	30 (15)	1000
20S Walter	04	Mar - 06 Mar	6	30 (15)	1000
21P Hilda	04	Mar - 07 Mar	7	60 (31)	980
22S Felana	08	Mar - 15 Mar	13	45 (23)	991
23S Gregoara	13	Mar - 22 Mar	18	110 (57)	933
24S Alex	16	Mar - 24 Mar	17	130 (67)	910
25P Ivor	16	Mar - 22 Mar	14	75 (39)	968
26P Rae	22	Mar - 23 Mar	4	40 (21)	994
27S ----	13	Apr - 14 Apr	3	45 (23)	991
28S Bessi	16	Apr - 17 Apr	3	40 (21)	994
29S Ikonjo	12	May - 20 May	18	55 (28)	984

Total: 298

* Regenerated

** Warnings Issued by NWOC

NOTE: Names of Southern Hemisphere Tropical Cyclones are given by the Regional Warning Centers (Nadi, Brisbane, Darwin, Perth, Reunion and Mauritius) and are appended to JTWC Warnings, when available.

TABLE 4-3

MONTHLY DISTRIBUTION OF SOUTH PACIFIC AND
SOUTH INDIAN OCEAN TROPICAL CYCLONES

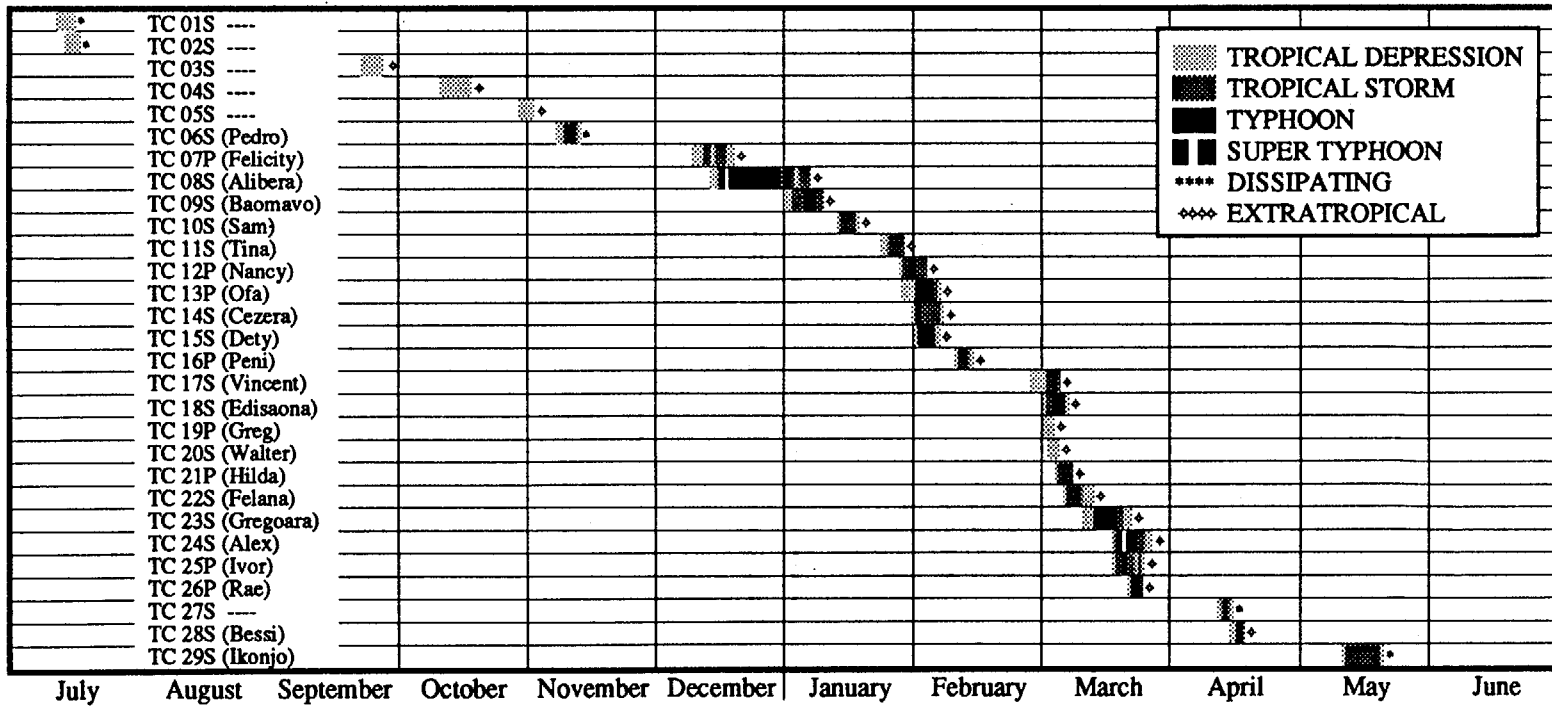
YEAR	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
(1959-1978)													
AVERAGE*	-	-	-	0.4	1.5	3.6	6.1	5.8	4.7	2.1	0.5	-	24.7
1981	0	0	0	1	3	2	6	5	3	3	1	0	24
1982	1	0	0	1	1	3	9	4	2	3	1	0	25
1983	1	0	0	1	1	3	5	6	3	5	0	0	25
1984	1	0	0	1	2	5	5	10	4	2	0	0	30
1985	0	0	0	0	1	7	9	9	6	3	0	0	35
1986	0	0	1	0	1	1	9	9	6	4	2	0	33
1987	0	1	0	0	1	3	6	8	3	4	1	1	28
1988	0	0	0	0	2	3	5	5	3	1	2	0	21
1989	0	0	0	0	2	1	5	8	6	4	2	0	28
1990	2	0	1	1	2	2	4	4	10	2	1	0	29
TOTAL CASES:	5	1	2	5	16	30	63	68	46	31	10	1	278
(1981-1990)													
AVERAGE:	0.5	0.1	0.2	0.5	1.6	3.0	6.3	6.8	4.6	3.1	1.0	0.1	27.8
* (Gray, 1979)													

TABLE 4-4

ANNUAL VARIATION OF SOUTHERN HEMISPHERE
TROPICAL CYCLONES BY OCEAN BASIN

YEAR	SOUTH INDIAN (WEST OF 105°E)	AUSTRALIAN (105°E - 165°E)	SOUTH PACIFIC (EAST OF 165°E)	TOTAL
(1959-1978)				
AVERAGE*	8.4	10.3	5.9	24.7
1981	13	8	3	24
1982	12	11	2	25
1983	7	6	12	25
1984	14	14	2	30
1985	14	15	6	35
1986	14	16	3	33
1987	9	8	11	28
1988	14	2	5	21
1989	12	9	7	28
1990	18	8	3	29
TOTAL CASES:	127	97	54	278
(1981-1989)				
AVERAGE:	12.7	9.7	5.4	27.8
* (Gray, 1979)				

Figure 4-1. Chronology of South Pacific and South Indian Ocean tropical cyclones for 1990.



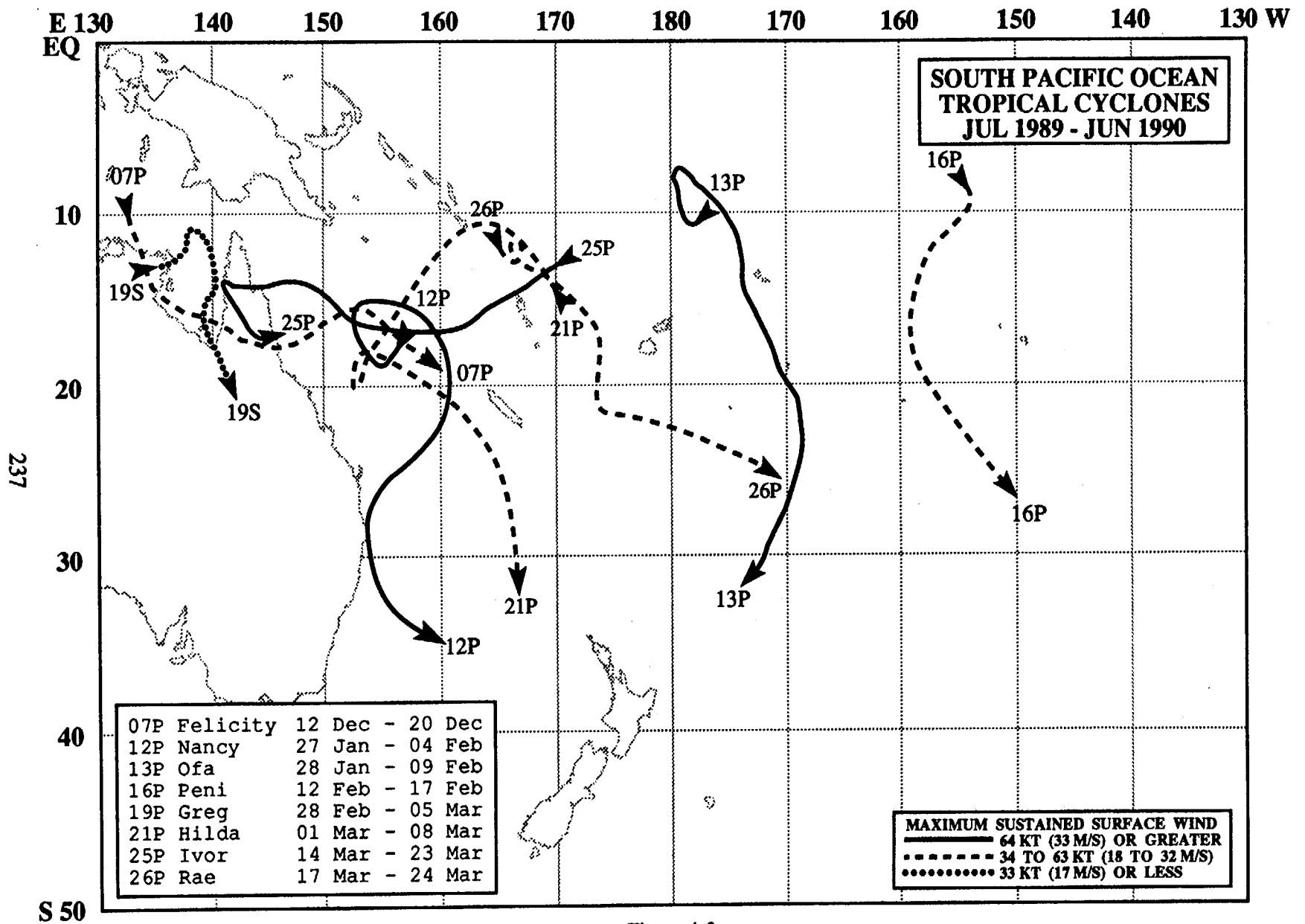


Figure 4-3.

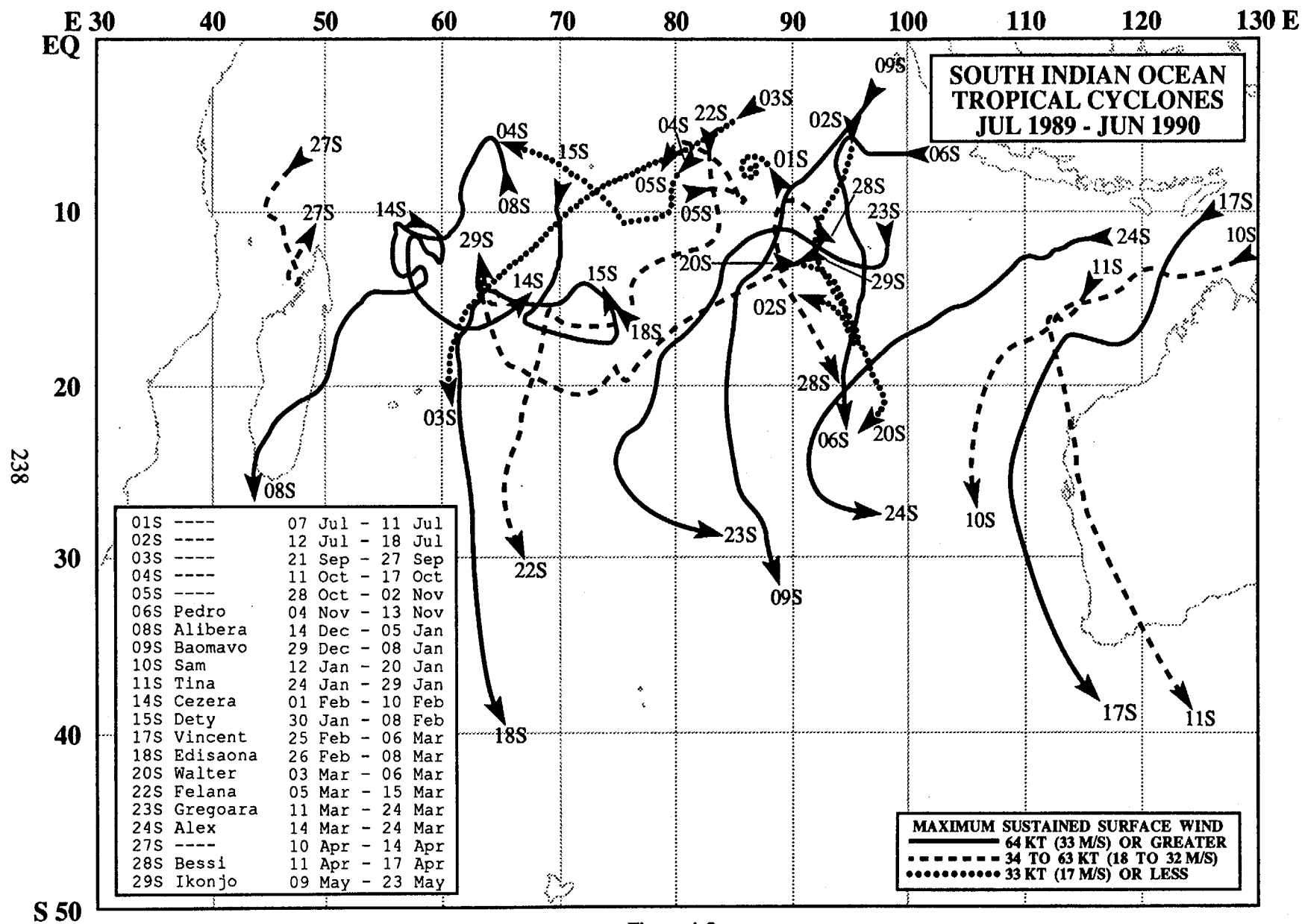


Figure 4-2.